MD. AHANAF ARIF KHAN

ahanaf019@gmail.com | ahanaf019.github.io

ahanaf019 | ahanaf019 | 0009-0005-6098-8318 | ResearchGate

Rajshahi-6202, Rajshahi, Bangladesh

Objective

Aspiring researcher with a strong foundation in deep learning, computer vision, and model efficiency, gained through hands-on work on fine-grained classification, vision transformers, and contrastive learning. Experienced in developing reproducible research pipelines and implementing state-of-the-art architectures from scratch. Passionate about advancing the fields of biomedical image analysis, signal processing, and computer vision through empirical research and open-source collaboration.

Education

- **University of Rajshahi** *2025*
  M.Sc. Engineering in Computer Science & Engineering Rajshahi, Bangladesh
  - CGPA: 3.88/4.00 (1st Semester)
- **University of Rajshahi** *2024*
  B.Sc. Engineering in Computer Science & Engineering Rajshahi, Bangladesh
  - CGPA: 3.90/4.00
- **Rajshahi College** *2018*
  Higher Secondary Certificate Rajshahi, Bangladesh
  - GPA: 5.00/5.00
- **Govt. Laboratory High School** *2016*
  Secondary School Certificate Rajshahi, Bangladesh
  - GPA: 5.00/5.00

Projects

- **VisionDesk: Employee activity monitoring using YOLOv8** *Mar 2025 – May 2025*
  Tools: Python, PyTorch, Ultralytics YOLOv8, OpenCV, NumPy, FastAPI, RTSP [GitHub]
  - Developed real-time multi-object detection app using YOLOv8 and FastAPI.
  - Customized dashboard to view employee stats over time.
  - Real-time feed for monitoring employee status.
  - Tuned activity detection with manually annotated workplace footage.
- **Vision Transformer (ViT) Custom Implementation** *Jun 2025*
  Tools: Python, PyTorch [GitHub]
  - Implemented end-to-end Vision Transformer from scratch, including patch embedding and multi-head self-attention.
  - Trained on custom datasets.
  - Visualized attention maps to understand model interpretability.
  - Packaged training, validation, and inference scripts for public use.
- **Swin Transformer Variant from Scratch** *Jun 2025*
  Tools: Python, PyTorch, Swin Transformer components, NumPy [GitHub]
  - Built window-based multi-head self-attention with shifting mechanism per Swin Transformer design.
  - Demonstrated performance gains in classification tasks compared to standard ViT.
  - Automated model checkpointing and fine-tuning utilities.
  - Conducted experiments on patch/window size sensitivity.
- **CutMix & MixUp Implementation in PyTorch: Regularization for Model Training** *Jun 2025*
  Tools: Python, PyTorch, torchvision [GitHub]
  - Implemented CutMix and MixUp data augmentation strategies to regularize CNN training.
  - Integrated both techniques into PyTorch training pipelines with custom datasets.
  - Compared model generalization and convergence behavior under different augmentation regimes.
  - Visualized mixed inputs and label distributions for interpretability and debugging.
- **Knowledge Distillation: ResNet50 → MobileNetV3 on STL-10** *Jun 2025*
  Tools: Python, PyTorch, ResNet50 teacher, MobileNetV3 student [GitHub]
  - Trained teacher-student pipeline transferring knowledge from a high-capacity ResNet50 to efficient MobileNetV3.

◦ Tuned temperature and loss weighting to balance mimicry and ground truth.

- **SimCLR Contrastive Learning Framework** *Apr 2025*
  Tools: Python, PyTorch, torchvision, contrastive loss [GitHub]
  ◦ Implemented SimCLR pipeline with dual-view augmentations and projection heads.
  ◦ Pre-trained encoder on unlabeled image dataset achieving robust representation scores.
  ◦ Evaluated learned embeddings on downstream tasks.

- **Semantic Segmentation Pipeline** *Dec 2024*
  Tools: PyTorch, U-Net variants [GitHub]
  ◦ Implemented U-Net semantic segmentation architecture for varied datasets.
  ◦ Implemented Vanilla U-Net and U-Net with pre-trained Resnet18 encoder.
  ◦ Visualized predictions versus ground truths for qualitative validation.
  ◦ Modularized code for dataset swapping and transfer learning.

- **Conditional GAN in Keras: Class-Conditioned Image Generation** *Nov 2024*
  Tools: Python, TensorFlow/Keras, NumPy, Matplotlib [GitHub]
  ◦ Built a Conditional GAN using Keras to generate MNIST digits conditioned on class labels.
  ◦ Designed generator and discriminator networks with label embedding and concatenation.
  ◦ Trained the model to produce class-consistent samples with minimal mode collapse.
  ◦ Visualized generated samples across epochs to monitor training quality.

- **Flower-Classification-Using-NN: Deep neural networks for fine-grained image classification** *Aug 2023*
  Tools: Python, Keras, TensorFlow, NumPy, Pandas, Jupyter Notebook [GitHub]
  ◦ Built and trained multiple CNN architectures to classify flower species from image datasets.
  ◦ Employed techniques like transfer learning and data augmentation to boost classification performance.
  ◦ Evaluated models using metrics like precision, recall, and top-k accuracy.

- **Flood-Segmentation: Flood image segmentation model(s)** *Jun 2023*
  Tools: Python, TensorFlow, Keras, OpenCV, Jupyter Notebook [GitHub]
  ◦ Designed and implemented a U-Net-based segmentation pipeline to delineate flood-affected regions from satellite imagery.
  ◦ Optimized training and data augmentation strategies to improve segmentation accuracy.

PUBLICATIONS

C=CONFERENCE, J=JOURNAL, S=IN SUBMISSION, P=PREPRINT

[P.1] **Md. Ahanaf Arif Khan**, Ariful Islam, Sangeeta Biswas, Md. Iqbal Aziz Khan, Subrata Pramanik, Sanjoy Kumar Chakravarty, Bimal Kumar Pramanik (2026). **BirdsEye-RU: A Dataset For Detecting Faces from Overhead Images** . *arXiv preprint*, DOI: arXiv.2601.12533.

[J.1] Sangeeta Biswas, **Md. Ahanaf Arif Khan**, Md. Hasnain Ali, Johan Rohdin, Subrata Pramanik, Md. Iqbal Aziz Khan, Sanjoy Kumar Chakravarty, Bimal Kumar Pramanik (2025). **Interpreting Deep Neural Networks in Diabetic Retinopathy Grading: A Comparison with Human Decision Criteria**. *Life*, Vol. 15, Issue 9, Article 1473. DOI: 10.3390/life15091473

[C.1] **Md. Ahanaf Arif Khan**, Md. Hasnain Ali, Nirjor Saha, Sadman Shoumik, et al. (2023). **Competency Comparison of Deep Neural Networks for Identifying Gender in Color Fundus Photographs**. In *Proceedings of the 26th International Conference on Computer and Information Technology (ICCIT 2023)*, pp. 1–6. IEEE. December 2023, Dhaka, Bangladesh. DOI: 10.1109/ICCIT60459.2023.10441623.

SKILLS

- **Specialized Area:** Deep Learning, Computer Vision, Signal Processing, Transformer Models
- **Research Skills:** Reproducible Pipelines, Model Evaluation, Literature Review, Paper Writing, Experiment Design, Attention Visualization
- **Programming Languages:** Python, C/C++, Java, Dart, JavaScript, PHP
- **Web Technologies:** HTML5, CSS, FastAPI, Flask, REST APIs, Laravel
- **Database Systems:** SQLite, MySQL, MongoDB
- **Data Science & Machine Learning:** PyTorch, torchvision, Huggingface Transformers, TensorFlow, Keras, scikit-learn, OpenCV, Pandas
- **Mathematical & Statistical Tools:** NumPy, SciPy, Matplotlib, Seaborn
- **Other Tools & Technologies:** Git, GitHub, Jupyter Notebook, LaTeX, Linux

Honors and Awards

- **ICT Fellowship** *2026*
  Information and Communication Technology Division, Government of the People's Republic of Bangladesh, Dhaka, Bangladesh
  ◦ Awarded the prestigious ICT Fellowship (FY 2025–26) to support and conduct my Master's thesis research.

- **Dean's Award** *2025*
  Faculty of Engineering, University of Rajshahi, Rajshahi, Bangladesh
  ◦ Recognition of Outstanding Academic Achievement for B.Sc. Engineering

- **UGC Stipend** *Jun 2025*
  University Grants Commission of Bangladesh, Dhaka, Bangladesh
  ◦ Recognition for graduating with the highest academic distinction in the Faculty of Engineering, University of Rajshahi — ranked first in the undergraduate program.

- **Champion** *May 2025*
  AI Hackathon 2025 — Powered by Akij Resource and Mutual Trust Bank PLC, Brac University Campus, Dhaka, Bangladesh
  ◦ Championed in the "Manufacturing" track as part of Team Machine_Mindset
  ◦ Developed an employee activity monitoring app, "VisionDesk" using YOLOv8.

- **Finalist** *Jun 2024*
  Robi Datathon 3.0, Robi Axiata Limited, Dhaka, Bangladesh
  ◦ Our team Machine_Mindset placed within the top 7 out of 1000 teams
  ◦ Used analytics, AI, and machine learning to solve real-world business challenges

- **Dean's Award** *2023*
  Faculty of Engineering, University of Rajshahi, Rajshahi, Bangladesh
  ◦ Recognition of Outstanding Academic Achievement for B.Sc. Engg., Part II, Examination 2020

- **Dean's Award** *2023*
  Faculty of Engineering, University of Rajshahi, Rajshahi, Bangladesh
  ◦ Recognition of Outstanding Academic Achievement for B.Sc. Engg., Part I, Examination 2019

Seminars & Workshops

- **Participant** *May 2025*
  Bangladesh AI Summit — Powered by Akij Resource and Mutual Trust Bank PLC
  ◦ Hosted by Bangladesh Innovation Conclave, Brac University, Dhaka, Bangladesh

- **Participant (Poster Presentation)** *Dec 2022*
  7^{th} International Conference on Computer, Communication, Chemical, Materials and Electronic Engineering ($IC^4ME^2 - 2022$)
  ◦ Hosted by the Faculty of Engineering, University of Rajshahi, Rajshahi-6205, Bangladesh

- **Participant (Poster Presentation)** *Dec 2021*
  6^{th} International Conference on Computer, Communication, Chemical, Materials and Electronic Engineering ($IC^4ME^2 - 2021$)
  ◦ Hosted by the Faculty of Engineering, University of Rajshahi, Rajshahi-6205, Bangladesh

Certifications

◦ **datacamp:** Python Data Associate *Feb 2025*

Additional Information

Languages: Bengali (Native), English (Professional Proficiency)

Interests: Traveling, Watching Movies, Exploring new ideas and technologies